THREE-DIMENSIONAL FABRIC

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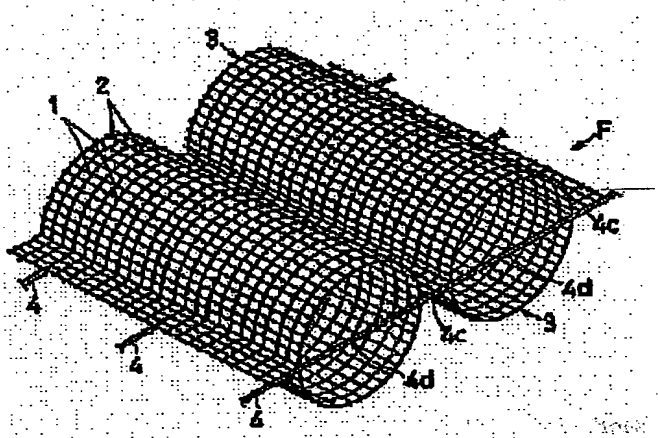
Abstract of **JP8226044**

PURPOSE: To form a good continuous cylindrical shape, secure high impact resilience, remarkably improve tensile strength and attain remarkable shortage of heat-treating time by constituting a fabric in continuous cylinder by dry heat restriction shrinkage treatment using a highly shrinkable yarn. CONSTITUTION: Upper and lower ground structures 3 and 3 in which warp 1 and weft 2 are constituted by plane weave or doup weave are provided and highly shrinkable yarn 4 having >=30% shrinkage factor is arranged at prescribed interval in the warp direction or weft direction between upper and lower ground structures 3 and 3 and a mixed weave 4c binding highly shrinkage yarn 4 to ground structure 3 is formed in single fabric part and an intermediate float yarn 4d in which the highly shrinkable yarn 4 and the ground structure 3 are unbound is formed in double fabric part to constitute a mixed fabric and the mixed fabric is subjected to dry heat restriction shrinkage treatment to form the fabric of continuous cylindrical structure.



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[Title of the Invention]

Three-Dimensional Fabric

[Abstract]

[Purpose]

Highly shrinkable yarns with a shrinkage of 30% or more are used and made into continuously cylindrical form by dry heat restriction shrinkage treatment, thereby making it possible to produce good, continuously cylindrical forms, secure high impact resilience, and attain significant improvement in resistance to tension and significant reduction in heat processing time.

[Constitution]

A three-dimensional structure cloth of a woven fabric characterized in that the fabric comprises: upper and lower ground structures 3, 3 constituted of warp 1 and weft 2 woven in plane or leno weave; highly shrinkable yarn 4 with shrinkage factor of 30% or more in the warp direction or the weft

direction between the upper and lower ground structures 3, 3 arranged at a predetermined interval, so that in a single weave portion the highly shrinkable yarn 4 and the ground structure 3 are bound to form a mixed weave 4c, while in a double weave portion the highly shrinkable yarn 4 is unbound with the ground structure 3 to form float weave in the intermediate part, the fabric being subjected to dry heat restriction shrinkage treatment to be continuously cylindrical.

[Claim(s)]

[Claim 1] Three-dimensional structure cloth of a woven fabric comprising: upper and lower ground structures constituted of warp and weft woven in plane or leno weave; highly shrinkable yarn with shrinkage factor of 30% or more in the warp direction or the weft direction between the upper and lower ground structures arranged at a predetermined interval, so that in a single weave portion the highly shrinkable yarn and the ground structure are bound to form a mixed weave, while in a double weave portion the highly shrinkable yarn is unbound with the ground structure to form float weave in the intermediate part, the fabric being subjected to dry heat restriction shrinkage treatment to be continuously cylindrical.

[Claim 2] The three-dimensional structure cloth as defined in claim 1, wherein said highly shrinkable yarns are composed of copolymer polyethylene terephthalate.

[Detailed Description of the Invention]

[0001]

[Industrially Applicable Field]

The present invention relates to a three-dimensional

structure cloth in continuously cylindrical form used for multipurpose, such as shock absorbing material, air or water permeable cushion material, civil engineering material, filters for air conditioners, nets for drainage, water culture material, etc.

[0002]

[Prior Art]

As for a conventional three-dimensional structure cloth in continuously cylindrical form, there is one disclosed, for example, in the Japanese laid-open patent publication No. 88462/1991. Specifically, in the three-dimensional structure cloth, synthetic resin fiber whose surface material has high thermal shrinkage is combined with synthetic resin fiber having a lower thermal shrinkage than that or no thermal shrinkage to constitute a woven fabric formed in plane or leno weave, which is then thermally processed to form resilient portions in continuously cylindrical form by curving synthetic resin fiber having higher thermal shrinkage or having no thermal shrinkage.

[0003]

However, in such a three-dimensional structure cloth there is used polyethylene monofilament having the maximum shrinkage of about 20% as a synthetic resin fiber having higher thermal shrinkage, which causes difficulty in obtaining sufficient shrinkage, due to which a three-dimensional structure cloth in better continuously cylindrical form cannot be obtained, which necessarily causes to form flat cylindrical forms extremely thin in thickness (a thickness of about 2 - 5 mm at the highest), resulting in reduced impact resilience, poor resistance to tension and worsened durability, which have been a problem. In

addition, due to low shrinkage of polyethylene monofilament, it has also been a problem that thermal processing takes time as long as 0.5 - 3 hours.

[0004]

[Problems To Be Solved By The Invention]

It is an object of the invention as defined in claim 1 to provide a three-dimensional structure cloth, in which highly shrinkable yarns with a shrinkage of 30% or more are used and made into continuously cylindrical form by dry heat restriction shrinkage treatment, thereby making it possible to produce good continuously cylindrical forms, secure high impact resilience, and attain significant improvement in resistance to tension and significant reduction in heat processing time.

[0005]

It is an object of the invention as defined in claim 2, in addition to the object of the invention as defined in claim 1, to provide a three-dimensional structure cloth, in which copolymer polyethylene terephthalate having a shrinkage of 45 - 50% is used as the highly shrinkable yarns described above to make it possible to secure sufficient shrinkage as well as to attain significantly improved impact resilience by forming much better continuously cylindrical forms.

[0006]

[Means To Solve The Problems]

The present invention as defined in claim 1 is a three-dimensional structure cloth of woven fabric, characterized in that the fabric comprises upper and lower ground structures constituted of warp and weft woven in plane or leno weave;

highly shrinkable yarn with shrinkage factor of 30% or more in the warp direction or the weft direction between the upper and lower ground structures arranged at a predetermined interval, so that in a single weave portion the highly shrinkable yarn and the ground structure are bound to form a mixed weave, while in a double weave portion the highly shrinkable yarn is unbound with the ground structure to form float weave in the intermediate part, the fabric being subjected to dry heat restriction shrinkage treatment to be continuously cylindrical.

[0007]

The present invention as defined in claim 2 is a three-dimensional structure cloth, characterized in that, in addition to the structure in accordance with the invention as defined in claim 1, said highly shrinkable yarns are composed of copolymer polyethylene terephthalate.

[0008]

[Operation and Advantages of The Invention]

According to the invention as defined in claim 1, when the woven fabric having highly shrinkable yarns woven in mixed weave in the single weave portion and having highly shrinkable yarns formed into float weave in the intermediate part in the double weave portion is subjected to dry heat restriction shrinkage treatment (treatment for restricting and regulating shrinkage in order to produce continuously cylindrical forms), the highly shrinkable yarns shrink in the arrangement direction at a shrinkage rate of 30% or more and restrictively, thereby making it possible to constitute a warped and good continuously cylindrical-formed three-dimensional structure cloth. As a result, it is possible to obtain such effects that high impact

resilience can be obtained, the significant improvement in resistance to tension is attained, which leads to improved significant reduction in time required for heat treatment.

[0009]

According to the invention as defined in claim 2, in addition to the advantages of the invention as defined in claim 1, it is possible to obtain such an effect that copolymer polyethylene terephthalate with shrinkage of 45 - 50% is used as the above-described highly shrinkable yarns, sufficient shrinkage can be obtained and the high shrinkage produces much better continuously cylindrical forms to attain heightened impact resilience.

[0010]

[Embodiment(s)]

In the following, embodiments in accordance with the invention will be described in detail with reference to the accompanying drawings. The drawings show a three-dimensional structure cloth. In FIG. 1, polypropylene monofilament (this monofilament has rigidity and is capable of maintaining shape stability in three-dimensional structure of a three-dimensional structure cloth) of 1000 deniers is used in the warp 1 and the weft 2, in which the density is 25 yarns/inch for the warp and 7 yarns/inch for the weft (roughly shown in the figure), and the warp 1 and weft 2 are woven to be interlaced with each other (see FIG. 5), to constitute upper and lower ground structures 3 having no deflection in position between the yarns 1 and 2.

[0011]

In The weft direction between upper and lower ground

structures 3 described above (direction of the weft 2 in FIG. 1), as highly shrinkable yarns 4 and 5, copolymer ethylene terephthalate multi-yarns (a multi-yarn is one consisted of a plurality of yarns) having highly shrinkage of 45-50% and 1000 deniers are used and arranged with a density of 2.5 yarns/inch at a constant interval.

[0012]

A mixed-woven fabric E is so constituted that in a single weave portion the highly shrinkable yarn 4 and the ground structure 3 are bound to form a mixed weave 4c, while in a double weave portion the highly shrinkable yarn 4 is unbound with the ground structure 3 to form float weave 4d in the intermediate part. The length of the above-described single weave portion S is set, for example, to be 1 cm and the same of the double weave portion D, for example, to be 4 cm, respectively.

[0013]

A woven fabric E shown in FIG. 1 has been subjected, for example, to 45% overfeed treatment (dry heat restriction shrinkage treatment) at 1300C for five minutes to constitute a three-dimensional structure cloth F in continuously vertical cylinder-form having the cylinder diameter of about 2.5 cm as shown in FIG. 2. More specifically, when the above-described woven fabric E is subjected to dry heat restriction shrinkage treatment, highly shrinkable yarns 4 shrink in the longitudinal direction by a predetermined percent to cause the ground structure 3 to curve and form the double weave portion D to be cylindrical and the single weave portion S to be a connection between the cylindrical forms, with the result that a

continuously vertical cylinder-shaped three-dimensional structure cloth F is formed.

[0014]

As described above, when the woven fabric (mixed-woven fabric) E having highly shrinkable yarns 4 woven in mixed weave 4c in the single weave portion S and having highly shrinkable yarns formed into float weave 4d in the intermediate part in the double weave portion D is subjected to dry heat restriction shrinkage treatment (treatment for restricting and regulating shrinkage in order to form cylindrical forms), the highly shrinkable yarns 4 restrictedly shrink at a shrinkage rate of 30% or more (45% in this embodiment) in their arranged direction (lateral direction) to thus make it possible to constitute a good continuous cylinder-shaped three-dimensional structure cloth F.

[0015]

As a result, it is possible to obtain such effects that high impact resilience can be secured as well as significant improvement in resistance to tension can be attained, which in turn leads to significant reduction in time required for heat treatment.

[0016]

In addition to the above, it is possible to obtain such an effect that as copolymer polyethylene terephthalate with a shrinkage rate of 45 - 50% is used as the above-described highly shrinkable yarns 4, sufficient shrinkage can be obtained and the high shrinkage produces much better continuously vertical cylinder-forms to attain heightened impact resilience.

[0017]

In addition, the above-described ground structure 3 may be constituted of the warp 1 and the weft 2 in plane weave, as shown in FIG. 6. Further, the continuously vertical cylinder-shaped three-dimensional structure cloth so constituted as described above is formed to have even thickness and has high repellency and resilience as well as it is excellent in air or water permeability and cushion property, and therefore, it can be used for multipurpose, such as shock absorbing material, air permeable cushion material, civil engineering material, filters for air conditioners, nets for drainage, water culture material, etc.

[0018]

FIGS. 3 and 4 show another embodiment of the three-dimensional structure cloth. In FIG. 3, polypropylene monofilament (this monofilament has rigidity and is capable of maintaining shape stability in the three-dimensional structure of a three-dimensional structure cloth) of 1000 deniers is used in the warp 1 and the weft 2 to attain the vertical density of 25 yarns/inch and the lateral density of 7 yarns/inch (roughly shown in the figure), and the warp 1 and the weft 2 are woven to be interlaced with each other (as shown in FIG. 5) to constitute upper and lower ground structures 3,3 having no deflection in position between the respective yarns 1 and 2.

[0019]

In the above-described upper and lower structures 3, 3, copolymer polyethylene terephthalate multi-yarn (multi-yarn described here is referred to a yarn constituted of multiple

number of yarns) of 1000 deniers having its shrinkage rate of 45 - 50% is used as highly shrinkable yarns 5 in the vertical direction (the direction same as that of the warp 1 in FIG. 3) and arranged at an equal interval of 2.5 yarns/inch.

[0020]

A mixed-woven fabric G is so constituted that in a single weave portion S the highly shrinkable yarn 5 and the ground structure 3 are bound to form a mixed weave 5c, while in a double weave portion D the highly shrinkable yarn 5 (interlaced yarn) is unbound with the ground structure 3 to form a float weave 5d in the intermediate part. The length of the above-described single weave portion S is set, for example, to be 1 cm and the same of the double weave portion D, for example, to be 4 cm, respectively.

[0021]

A woven fabric G shown in FIG. 3 has been subjected, for example, to 45% overfeed treatment (dry heat restriction shrinkage treatment) at 1300C for five minutes to constitute a three-dimensional structure cloth H in continuously lateral cylinder-form having the cylinder diameter of about 2.5 cm as shown in FIG. 4. More specifically, when the above-described woven fabric G is subjected to dry heat restriction shrinkage treatment, highly shrinkable yarns 5 shrink in the longitudinal direction by a predetermined percent to cause the ground structure 3 to curve and form the double weave portion D to be cylindrical and the single weave portion S to be a connection between the cylindrical forms, with the result that a continuously lateral cylinder-shaped three-dimensional structure cloth H is formed.

[0022]

As described above, when the woven fabric (mixed-woven fabric) G having highly shrinkable yarns 5 woven in mixed weave 5c in the single weave portion S and having highly shrinkable yarns 5 formed into float weave 5d in the intermediate part in the double weave portion D is subjected to dry heat restriction shrinkage treatment (treatment for restricting and regulating shrinkage in order to form cylindrical forms), the highly shrinkable yarns 5 restrictedly shrink at a shrinkage rate of 30% or more (45% in this embodiment) in their arranged direction (warp direction) to thus make it possible to constitute a good continuous cylinder-shaped three-dimensional structure cloth H.

[0023]

As a result, it is possible to attain such effects that high impact resilience can be obtained as well as the significant improvement in resistance to tension is attained, which leads to improved significant reduction in time required for heat treatment.

[0024]

In addition to the above, it is possible to attain such an effect that copolymer polyethylene terephthalate with shrinkage of 45 - 50% is used as the above-described highly shrinkable yarns 5, sufficient shrinkage can be obtained and the high shrinkage produces much better continuously cylindrical-forms to attain heightened impact resilience.

[0025]

In addition, the above-described ground structure 3 may be

constituted of the warp 1 and the weft 2 in plane weave, as shown in FIG. 6. Further, as the continuously lateral cylinder-shaped three-dimensional structure cloth H so constituted as described above is formed to have even thickness and has high repellency and resilience as well as it is excellent in air or water permeability and cushion property, it can be used for multipurpose, such as shock absorbing material, air permeable or water permeable cushion material, civil engineering material, filters for air conditioners, nets for drainage, water culture material, etc. In the correlation of the present invention with the above-described embodiments, the warp 1 and the weft 2 in the present invention correspond to polypropylene monofilament of 1000 deniers in the embodiment, the ground structure 3 corresponds to the interlaced weave as shown FIG. 5 or the plane weave as shown in FIG. 6, and the highly shrinkable yarns with shrinkage of 30% or more correspond to copolymer polyethylene terephthalate multi-yarn of 1000 deniers, while the present invention is not confined only to the structure of the above-described embodiment.

[0026]

In the above-described embodiments, both the warp 1 and the weft 2 are formed by the monofilament yarn. In another embodiment, one of the warp 1 and the weft 2 may be formed by the monofilament yarn, and the other may be formed by multifilament yarn or flat yarn. Material for the monofilament yarn used in the warp 1 and the weft 2 may be, for example, such as polyester, polyamide or polyethylene instead of the above-described polypropylene. The denier of the monofilament yarn may be freely selected in the range of 100 - 2000 deniers, in addition to 1000 deniers, according to every purpose of use. The

cushion property can be freely adjusted by selecting the degree of denier. On the other hand, the multifilament yarn or flat yarn used in the ground structure, because of having low impact resilience, is fit to use in a purpose that air permeable or water permeable is poor. If corrosion over time is required, natural fiber or synthetic resin fiber may be used in the warp or the weft. And further, difference in shrinkage between the highly shrinkable yarns 4, 5 described above and the monofilament, multifilament yarn or flat yarn constituting the ground structure is preferably 10-50%.

[0027]

In addition, the density for the warp, the weft and arranging the highly shrinkable yarns 4, 5, and the length of the single weave portion S and of the double weave portion D may be determined suitably corresponding to various purpose.

[Brief Description of the Drawing(s)]

[FIG. 1] is a partial plan view showing the state of a three-dimensional structure cloth in accordance with the invention prior to dry heat restriction shrinkage treatment.

[FIG. 2] is a partial perspective view showing a continuously vertical cylinder-shaped three-dimensional structure cloth in accordance with the invention.

[FIG. 3] is a partial plan view showing the state of a three-dimensional structure cloth in another embodiment of the invention prior to dry heat restriction shrinkage treatment.

[FIG. 4] is a partial perspective view showing a continuously lateral cylinder-shaped three-dimensional structure cloth in accordance with the invention.

[FIG. 5] is a partial plan view showing an embodiment of a

ground structure.

[FIG. 6] is a partial plan view showing another embodiment of the ground structure.

[List of Reference Numerals]

1....Warp

2....Weft

3....Ground Structure

4, 5...Highly Shrinkable Yarns

4c, 5c...Mixed Weave Parts

4d, 5d...Float Weave Parts of Intermediate Part

E, G....Woven Fabric

F, H....Three-dimensional Structure Cloth

D....Double Weave Portion

S....Single Weave Portion

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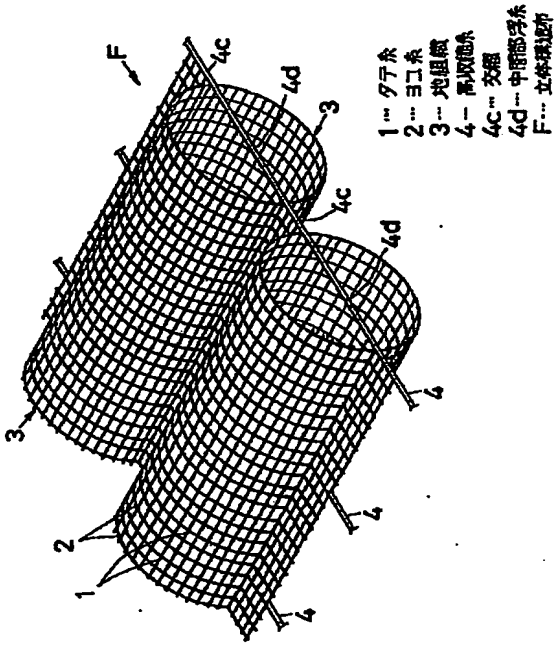
(54)【発明の名称】　立体構造布

(57)【要約】

【目的】収縮率３０％以上の高収縮糸を用い、かつ乾熱制限収縮処理により連続筒状に構成することで、整形された良好な連続筒状を形成することができて、高い反発弾性力を確保することができるうえ、抗張力の大幅な向上を図り、かつ熱処理時間の大幅な短縮を達成する。

【構成】タテ糸１およびヨコ糸２が平織もしくは搦み織されて構成された上下の地組織３，３を設け、上記上下の地組織３，３間のタテ方向もしくはヨコ方向に収縮率３０％以上の高収縮糸４が所定間隔で配列され、一重織部で上記高収縮糸４と地組織３とを結合する交織４ｃとなす一方、二重織部で上記高収縮糸４が地組織３と非結合となる中間部浮糸４ｄと成した織物を乾熱制限収縮処理して連続筒状に構成したことを特徴とする。



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【特許請求の範囲】

【請求項1】タテ糸およびヨコ糸が平織もしくは搦み織されて構成された上下の地組織を設け、上記上下の地組織間のタテ方向もしくはヨコ方向に収縮率30％以上の高収縮糸が所定間隔で配列され、一重織部で上記高収縮糸と地組織とを結合する交織となす一方、二重織部で上記高収縮糸が地組織と非結合となる中間部浮糸と成した織物を乾熱制限収縮処理して連続筒状に構成した立体構造布。

【請求項2】上記高収縮糸として共重合ポリエチレンテレフタレートを用いた請求項1記載の立体構造布。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、例えば、緩衝材、通気性クッション材、通水性クッション材、土木用資材、空調機のフィルタ材、排水用のネット材、水耕栽培用資材などの多目的に用いられる連続筒状の立体構造布に関する。

【0002】

【従来の技術】従来の連続筒状の立体構造布としては、例えば、実開平3－88462号公報に記載のものがある。すなわち、表面材が熱収縮性の大きい合成樹脂繊維と、これより熱収縮性の小さいか、もしくは熱収縮性のない合成樹脂繊維とを組合せて織成した平織や搦み織等からなる織地を熱処理して、上記熱収縮性の大きい合成樹脂繊維により熱収縮性の小さいか、もしくは熱収縮性のない合成樹脂繊維の屈曲による弾性部を形成させて、連続筒状に構成した立体構造布である。

【0003】しかし、この従来の立体構造布にあっては熱収縮性の大きい合成樹脂繊維としてその収縮率が最大20％前後のポリエチレンモノフィラメントが用いられているので、充分な収縮率が得られず、これに起因して立体構造布の良好な連続筒状が得られないので、必然的に厚さが極めて薄い偏平な筒状（厚みの高さがせいぜい2～5㎜程度）となって反発弾性力が小となるばかりでなく、抗張力が弱く、耐久性が悪い問題点があった。加えて、ポリエチレンモノフィラメントの収縮率の悪さに起因して、熱処理時間も0．5～3時間の長時間を要するという問題点があった。

【0004】

【発明が解決しようとする課題】この発明の請求項1記載の発明は、収縮率30％以上の高収縮糸を用い、かつ乾熱制限収縮処理により連続筒状に構成することで、整形された良好な連続筒状を形成することができて、高い反発弾性力を確保することができるうえ、抗張力の大幅な向上を図ることができ、かつ熱処理時間の大幅な短縮を図ることができる立体構造布の提供を目的とする。

【0005】この発明の請求項2記載の発明は、上記請求項1記載の発明の目的と併せて、上記高収縮糸として収縮率が45～50％の共重合ポリエチレンテレフタレートを用いることで、充分な収縮率を確保すると共に、より一層良好な連続筒状と成して、高反発弾性力の向上を図ることができる立体構造布の提供を目的とする。

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【0006】

【課題を解決するための手段】この発明の請求項1記載の発明は、タテ糸およびヨコ糸が平織もしくは搦み織されて構成された上下の地組織を設け、上記上下の地組織間のタテ方向もしくはヨコ方向に収縮率30％以上の高収縮糸が所定間隔で配列され、一重織部で上記高収縮糸と地組織とを結合する交織となす一方、二重織部で上記高収縮糸が地組織と非結合となる中間部浮糸と成した織物を乾熱制限収縮処理して連続筒状に構成した立体構造布であることを特徴とする。

【0007】この発明の請求項2記載の発明は、上記請求項1記載の発明の目的と併せて、上記高収縮糸として共重合ポリエチレンテレフタレートを用いた立体構造布であることを特徴とする。

【0008】

【発明の作用及び効果】この発明の請求項1記載の発明によれば、上述の一重織部で高収縮糸が交織され、二重織部で高収縮糸が中間部浮糸とされた織物を乾熱制限収縮処理（筒状を整形するための縮み率を制限、規制する処理）すると、この高収縮糸がその配列方向に収縮率30％以上で、かつ制限収縮するので、整形された良好な連続筒状の立体構造布を構成することができる。この結果、高い反発弾性力を確保することができると共に、抗張力の大幅な向上を図ることができる効果があり、しかも熱処理時間の大幅な短縮を図ることができる効果がある。

【0009】この発明の請求項2記載の発明によれば、上記請求項1記載の発明の効果と併せて、上述の高収縮糸として収縮率が45～50％の共重合ポリエチレンフタレートを用いたので、充分な収縮率を確保することができると共に、高い収縮率により、より一層良好な連続筒状と成して、高反発弾性力の向上を図ることができる効果がある。

【0010】

【実施例】この発明の一実施例を以下図面に基づいて詳述する。図面は立体構造布を示し、図1においてタテ糸1およびヨコ糸2に1000デニールのポリプロピレン製モノフィラメント（このモノフィラメントは立体構造布の立体構造形態安定性を維持し得る剛性をもつモノフィラメントである）を用い、タテ密度を25本／インチ、ヨコ密度を7本／インチ（但し図面では概略示している）とし、上述のタテ糸1およびヨコ糸2を搦み織（図5参照）して、各糸1，2の位置ずれがない上下の地組織3，3を構成している。

【0011】上述の上下の地組織3，3間におけるヨコ方向（図1のヨコ糸2と同一の方向）に高収縮糸4として、その高収縮率が45～50％で、1000デニール

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の共重合ポリエチレンテレフタレートマルチ糸（ここにマルチ糸とは多本数で1本の糸が構成されたもの）を用い、2．5本／インチの等間隔で配列している。

【0012】而して、一重織部Sで上述の高収縮糸4と地組織3とを平織にて結合する交織4cとなす一方、二重織部Dで上述の高収縮糸4が地組織3と非結合となる中間部浮糸4dと成した交織織物Eを構成している。ここで、上述の一重織部Sの長さは例えば1cmに、二重織部Dの長さは例えば4cmにそれぞれ設定している。

【0013】上述の図1に示す交織織物Eを例えば130℃の乾熱で5分間、45％の幅入れセット処理（乾熱制限収縮処理）して、図2に示す如き筒部の直径が約2．5cmφの連続タテ筒状の立体構造布Fを構成したものである。すなわち、上述の織物Eを乾熱制限収縮処理すると、高収縮糸4が所定パーセントだけその長手方向に収縮するので、二重織部Dが筒状となり、一重織部Sが筒状相互間の連結部となるように地組織3が屈曲して、連続タテ筒状の立体構造布Fが形成される。

【0014】このように上述の一重織部Sで高収縮糸4が交織4cされ、二重織部Dで高収縮糸が中間部浮糸4dとされた織物（交織織物）Eを乾熱制限収縮処理（形状を成形するために縮み率を制限、規制する処理）すると、この高収縮糸4がその配列方向（ヨコ方向）に収縮率30％以上で、かつ制限収縮（この実施例では45％収縮）するので、整形された良好な連続筒状の立体構造布Fを構成することができる。

【0015】この結果、高い反発弾性力を確保することができると共に、抗張力の大幅な向上を図ることができる効果があり、しかも熱処理時間の大幅な短縮を図ることができる効果がある。

【0016】加えて、上述の高収縮糸4として収縮率が45～50％の共重合ポリエチレンテレフタレートを用いたので、充分な収縮率を確保することができると共に、高い収縮率により、より一層良好な連続タテ筒状と成して、高反発弾性力の向上を図ることができる効果がある。

【0017】なお、上述の地組織3は図6に示すようにタテ糸1およびヨコ糸2を平織にして構成してもよい。また上述の構成の連続タテ筒状の立体構造布Fは均一な厚みに構成され、大きい反発力、弾性力を有すると共に、通気性、通水性、クッション性に優れるので、緩衝材、通気性クッション材、土木用資材、空調機のフィルタ材、排水用ネット材、水耕栽培用資材などの多目的に用いることができる。

【0018】図3、図4は立体構造布の他の実施例を示し、図3においてタテ糸1およびヨコ糸2に1000デニールのポリプロピレン製モノフィラメント（このモノフィラメントは立体構造布の立体構造形態安定性を維持し得る剛性をもつモノフィラメントである）を用い、タテ密度を25本／インチ、ヨコ密度を7本／インチ（但し図面では概略示している）とし、上述のタテ糸1およびヨコ糸2を搦み織（図5参照）して、各糸1，2の位置ずれがない上下の地組織3，3を構成している。

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【0019】上述の上下の地組織3，3間におけるタテ方向（図3のタテ糸1と同一の方向）に高収縮糸5として、その収縮率が45～50％で、1000デニールの共重合ポリエチレンテレフタレートマルチ糸（ここにマルチ糸とは多本数で1本の異とが構成されたもの）を用い、2．5本／インチの等間隔で配列している。

【0020】而して一重織部Sで上述の高収縮糸5と地組織3とを搦み織にて結合する交織5cとなす一方、二重織部Dで上述の高収縮糸5（からみ糸）が地組織3と非結合となる中間部浮糸5dと成した交織織物Gを構成している。ここで、上述の一重織部Sの長さは例えば1cmに、二重織部Dの長さは例えば4cmにそれぞれ設定している。

【0021】上述の図3に示す交織織物Gを例えば130℃の乾熱で5分間、45％オーバーフィード処理（乾熱制限収縮処理）して、図4に示す如き筒部の直径が約2．5cmφの連続ヨコ筒状の立体構造布Hを構成したものである。すなわち、上述の織物Gを乾熱制限収縮処理すると、高収縮糸5が所定パーセントだけその長手方向に収縮するので、二重織部Dが筒状となり、一重織部Sが筒状相互間の連結部となるように地組織3が屈曲して、連続ヨコ筒状の立体構造布Hが形成される。

【0022】このように上述の一重織部Sで高収縮糸5が交織5cされ、二重織部Dで高収縮糸5が中間部浮糸5dとされた織物（交織織物）Gを乾熱制限収縮処理（形状を成形するために縮み率を制限、規制する処理）すると、この高収縮糸5がその配列方向（タテ方向）に収縮率30％以上で、かつ制限収縮（この実施例では45％収縮）するので、整形された良好な連続筒状の立体構造布Hを構成することができる。

【0023】この結果、高い反発弾性力を確保することができると共に、抗張力の大幅な向上を図ることができる効果があり、しかも熱処理時間の大幅な短縮を図ることができる効果がある。

【0024】加えて、上述の高収縮糸5として収縮率が45～50％の共重合ポリエチレンテレフタレートを用いたので、充分な収縮率を確保することができると共に、高い収縮率により、より一層良好な連続横筒状と成して、高反発弾性力の向上を図ることができる効果がある。

【0025】なお、上述の地組織3は図6に示すようにタテ糸1およびヨコ糸2を平織にして構成してもよい。また上記構成の連続ヨコ筒状の立体構造布Hは均一な厚みに構成され、大きい反発力、弾力性を有すると共に、通気性、通水性、クッション性に優れるので、緩衝材、通気性クッション材、通水性クッション材、土木用資材、空調材のフィルタ材、排水用ネット材、水耕栽培用

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資材などの多目的に用いることができる。　この発明の構成と、上述の実施例との対応において、この発明のタテ糸１およびヨコ糸２は実施例の１０００デニールのポリプロピレン製モノフィラメントに対応し、以下同様に、地組織３は、図５に示す搦み織もしくは図６に示す平織に対応し、収縮率３０％以上の高収縮糸は、１０００デニールの共重合ポリエチレンテレフタレートマルチ系に対応するも、この発明は、上述の実施例の構成のみに限定されるものではない。

【００２６】例えば上記各実施例においてはタテ糸１およびヨコ糸２を共にモノフィラメントで構成したが、これは何れか一方をモノフィラメント、他方をマルチ糸、偏平糸を用いて構成してもよく、上述のモノフィラメントの素材としては例示したポリプロピレンに代えてポリエステル、ポリアミド、ポリエチレン等を用いることができ、また上述のモノフィラメントの使用繊度は用途に対応して１０００デニール以外に１００～２０００デニールの範囲で自由に選定することができ、クッション性はデニールの選定により任意に調整可能であり、一方、地組織に用いるマルチ糸、偏平糸、一般に反発弾性が低いので、粗通気性、粗通水性の用途に適しており、経時腐蝕が要求されるような場合にはタテ糸、ヨコ糸の何れかに天然繊維や合成繊維を使用することもでき、さらには上述の高収縮糸４，５は地組織を構成するモノフィラメント、マルチ糸、偏平糸に対して両者の収縮差は１０～５０％が望ましい。

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【００２７】加えて、実施例で示したタテ密度、ヨコ密度、高収縮糸４，５の配列密度、一重織部Ｓの長さ、二重織部Ｄの長さは一例であって、用途に対応してこれらは任意に設定することができる。

【図面の簡単な説明】

【図１】本発明の立体構造布の乾熱制限収縮前の状態を示す部分平面図。

【図２】本発明の連続タテ筒状の立体構造布を示す部分斜視図。

【図３】本発明の立体構造布の他の実施例を示す乾熱制限収縮前の部分平面図。

【図４】本発明の連続ヨコ筒状の立体構造布を示す部分斜視図。

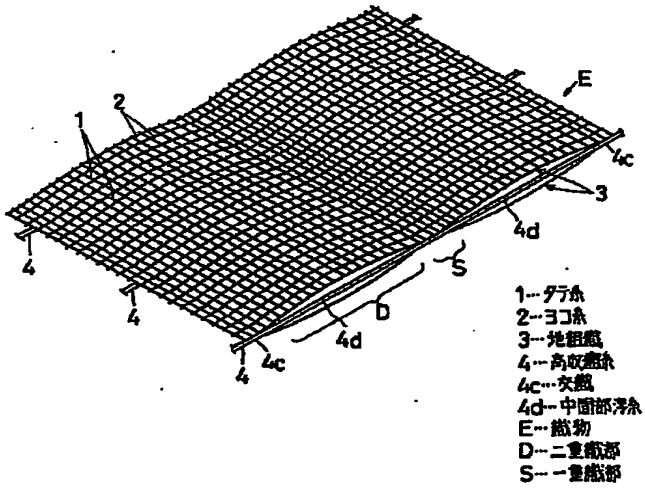
【図５】地組織の一例を示す部分平面図。

【図６】地組織の他の例を示す部分平面図。

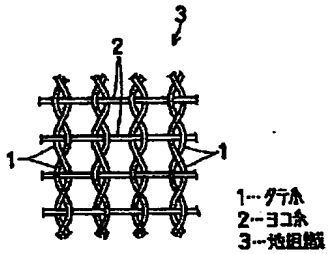
【符号の説明】

１…タテ糸
２…コヨ糸
３…地組織
４，５…高収縮糸
４ｃ，５ｃ…交織
４ｄ，５ｄ…中間部浮糸
Ｅ，Ｇ…繊物
Ｆ，Ｈ…立体構造布
Ｄ…二重織部
Ｓ…一重織部

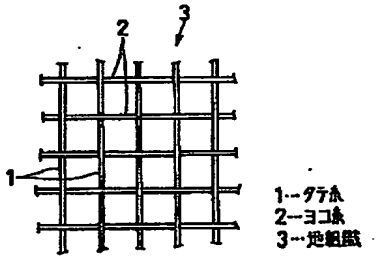
【図１】



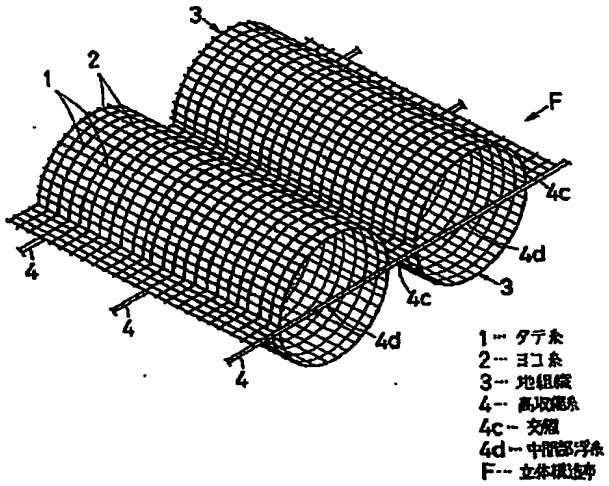
【図５】



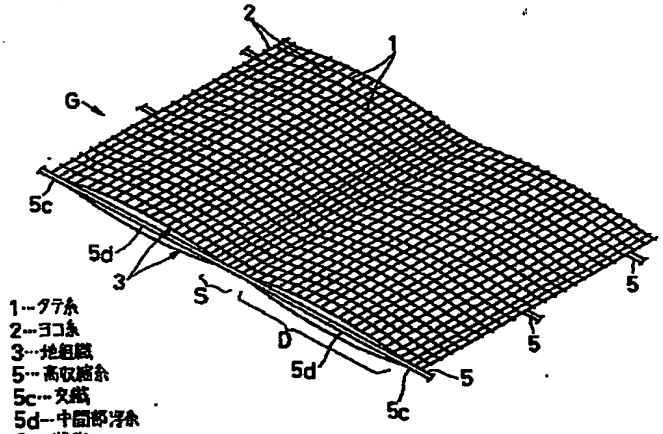
【図６】



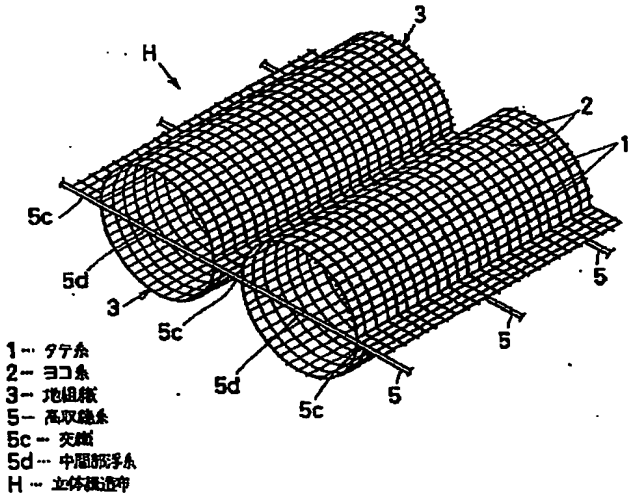
【図2】


3
2
1
F
4c
4d
3
4c
4
4
4d
4
1--タテ糸
2--ヨコ糸
3--地組織
4--高収縮糸
4c--交絡
4d--中間部浮糸
F--立体構造体

【図3】


2
1
G
5c
5d
3
S
5
D
5d
5
5
5c
1--タテ糸
2--ヨコ糸
3--地組織
5--高収縮糸
5c--交絡
5d--中間部浮糸
G--被物
D--二重織部
S--一重織部

【図4】


3
H
2
1
5c
5d
3
5c
5
5
5d
5c
5
1… タテ糸
2… ヨコ糸
3… 地組織
5… 高収縮糸
5c… 交絡
5d… 中間部浮糸
H… 立体構造体

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